



NEW ZEALAND



EDICT OF GOVERNMENT



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AS-NZS 2538 (2004) (English): Vehicle support stands
[By Authority of Australian Trade Practices Act 1974
- Consumer Protection Notice No. 12 of 2008]

*We will sell to no man,
we will not deny or defer to any man either justice or right.*

Magna Carta—Tūtohunga Nui

*Kore rawa e hoko ki te tangata, e kore e whakakāhoretia,
e tautuku rānei te tangata ki te ture, tika ranei.*



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Vehicle support stands

AS/NZS 2538:2004

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Australian Automotive Aftermarket Association
Australian Chamber of Commerce and Industry
Australian Competition and Consumer Commission
Australian Industry Group
Certification Bodies (Australia)
Competition & Consumer Policy Division, Department of the Treasury
Consumer Affairs Victoria
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Australian/New Zealand Standard™

Vehicle support stands

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PREFACE

This Standard was prepared by the Joint Australia/New Zealand Standards Committee CS-043, Vehicle Stands and Vehicle Ramps to supersede AS/NZS 2538:1995.

The objective of this Standard is to provide manufacturers, importers, consumers, retailers and testing bodies with a set of performance requirements, to ensure that vehicle support stands (also known as axle stands or jack stands) are sufficiently robust so that they will not fail under normal conditions of use, and to ensure that axle stands are designed and constructed so that they will be stable and will not damage the vehicle when used in the correct manner.

This edition revises the instructions for use, makes editorial changes to clarify the text and updates the document to the current style.

The Standard was originally prepared in response to a request by the Defence Standardization Committee which felt that its experience of unsatisfactory performance of vehicle support stands in the defence field would also be of concern to the general public that uses similar stands for domestic purposes.

The term 'normative' has been used in this Standard to indicate that the appendix to which it applies is an integral part of the Standard.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
Vehicle support stands

1 SCOPE

This Standard specifies requirements for the design, construction, performance and labelling of vehicle support stands.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1192 Electroplated coatings—Nickel and chromium

1789 Electroplated zinc (electrogalvanized) coatings on ferrous articles (batch process)

AS/NZS

3750 Paints for steel structures

3750.15 Part 15: Inorganic zinc silicate paint

3 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

3.1 Base plane

The plane of contact between the base of the vehicle support stand and the surface upon which it rests.

3.2 Nominated capacity

The capacity nominated by the manufacturer as the maximum load that is to be supported by a single vehicle support stand.

NOTE: Clause 8(b) requires that the nominated capacity be marked on the stand.

3.3 Projected plan area of the base

The maximum area in the base plane described by joining up the points of contact of the vehicle support stand with the base plane. (See Figure 1.)

3.4 Projected plan area of the engagement head

The area obtained by projecting the engagement head vertically downward onto the base plane. (See Figure 2.)

3.5 Stability factor

A measure of the ability of a vehicle support stand to resist tipping as a result of its geometric design.

3.6 Vehicle

Any wheeled vehicle used on a road including any towed unit such as a caravan or trailer, except any vehicle used on a railway or tramway.

3.7 Vehicle support stand

A device of fixed or adjustable height onto which an appropriate part, e.g. axle or chassis, of a raised vehicle is lowered and supported for the purpose of maintenance or storage of the vehicle. Where the device is of adjustable height, the height is not intended to be varied when the device is loaded.

NOTE: Vehicle support stands may be of either fixed height or adjustable height. Some typical vehicle support stands are illustrated in Figure 3.

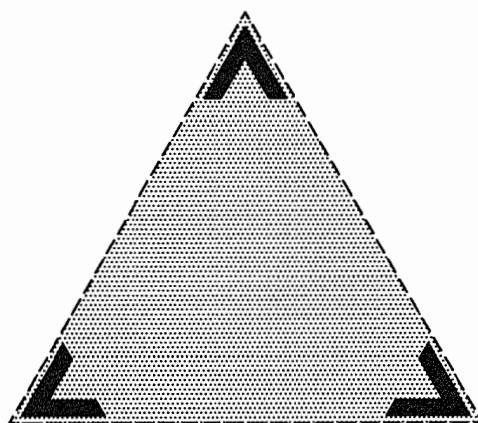


FIGURE 1 TYPICAL PROJECTED PLAN AREA OF A TRIPOD TYPE VEHICLE SUPPORT STAND BASE

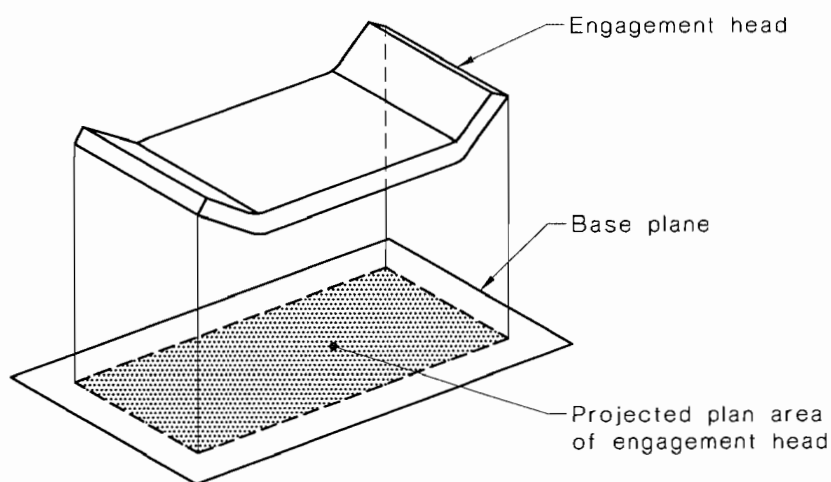


FIGURE 2 PROJECTED PLAN AREA OF TYPICAL ENGAGEMENT HEAD

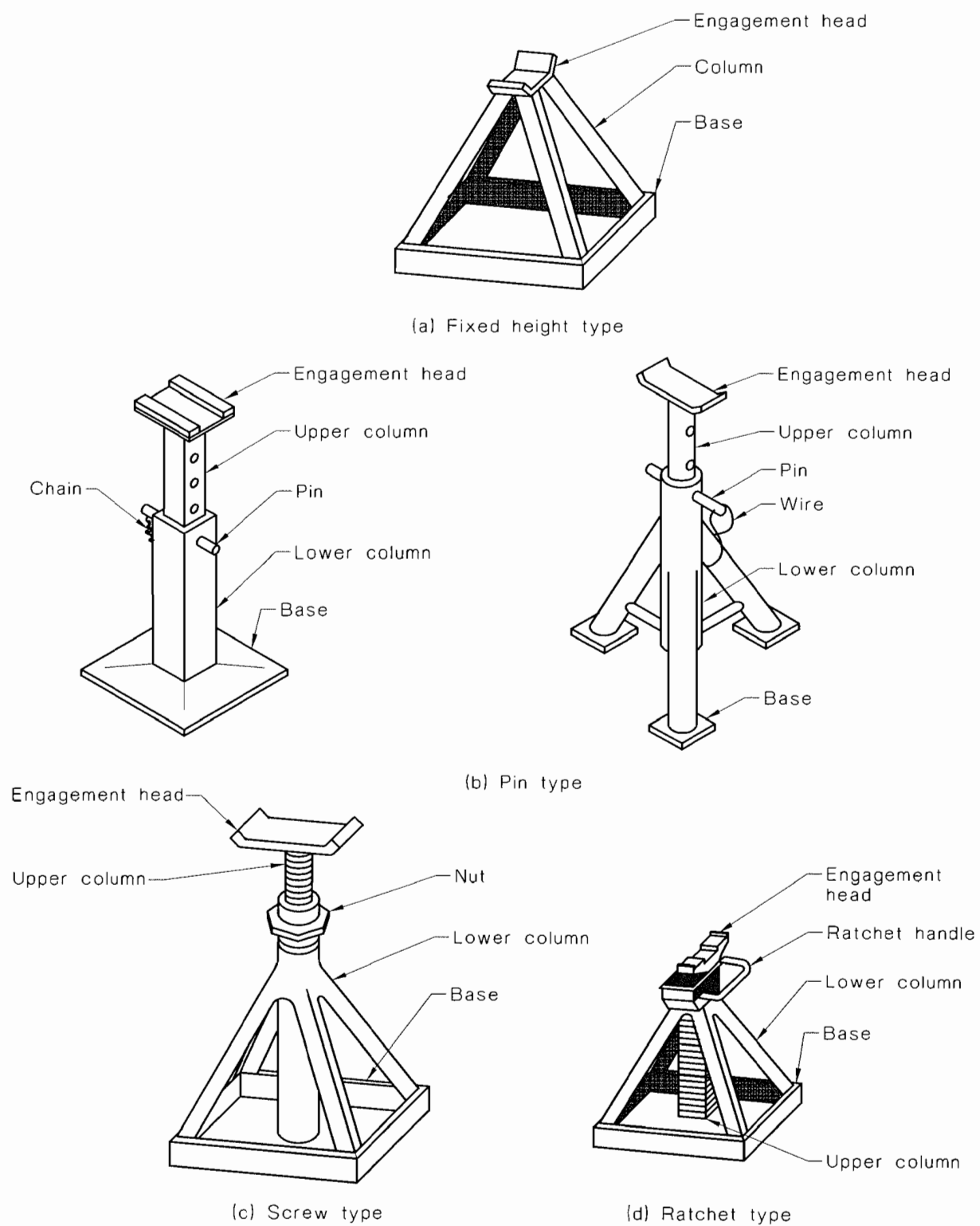


FIGURE 3 TYPICAL VEHICLE SUPPORT STANDS

4 DESIGN AND CONSTRUCTION

4.1 General

The vehicle support stand shall be designed and constructed so as to comply with all the relevant requirements specified in this Standard. It shall be free from defects that would affect its durability or serviceability and all screws, pins, bolts and similar parts shall have effective means for preventing loss of proper tightness and adjustment. All bearings and moving parts requiring periodic lubrication shall be provided with readily accessible means of applying lubrication.

4.2 Materials

Materials and assemblies thereof used in the manufacture of vehicle support stands shall not have been subject to stresses or strains that would result in failure and shall be free from blow holes, hard spots, shrinkage defects, cracks or other defects which would adversely affect the strength of the material.

NOTE: The purpose of this requirement is to ensure that materials used in the construction of vehicle support stands are new or have not previously been used in an application where the materials have been stressed to the point that would result in fatigue failure with subsequent use.

4.3 Minimum capacity

The minimum nominated capacity of a vehicle support stand shall be not less than 750 kg.

4.4 Stability factor

When determined by the method set out in Appendix A, the stability factor shall be not less than 7.0.

4.5 Engagement head

The engagement head of a vehicle support stand shall—

- (a) have a projected plan area of at least 3000 mm²; and
- (b) be capable of retaining a horizontal cylindrical bar of 100 mm nominal diameter when the stand assembly is inclined at 5° to the horizontal and the engagement head is inclined to its maximum out of parallel in the same direction.

NOTE: This is intended to provide a test of the shape of the engagement head and its ability to retain a 100 mm diameter axle housing.

4.6 Adjustable height stands

Where a vehicle support stand incorporates a means of adjusting its height, the stand shall comply with the following:

- (a) The height adjustment mechanism shall—
 - (i) be permanently attached to the stand;
 - (ii) be capable of easy and positive adjustment when the stand is not loaded;
 - (iii) be such that the upper column cannot be extended beyond the manufacturer's claimed maximum height except for any necessary extensions required to permit engagement of the mechanism; and
 - (iv) for stands where sudden release is possible, not release under load, when tested in accordance with Appendix B.
- (b) Pin type adjustment shall be permanently attached to the stand and shall include—
 - (i) a device on the pin to prevent over-inserting; and
 - (ii) if other than a simple pin, a design feature such that the stand cannot be used unless all parts of the device are fully engaged.

NOTE: For a stand with a pin type adjustment, the pin is to be attached to the stand by means of a metal linkage, e.g. chain or flexible wire.

- (c) The vehicle support stand shall be designed so that, except in those designs where the sides of the columns are brought into parallel alignment by the application of a load, when the upper column is extended to its highest possible position the angle formed by the axes of the upper and base portions due to clearances between these portions is not greater than 1.5° (see Figure 4).

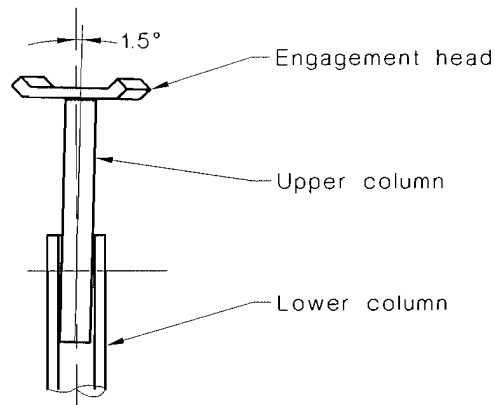


FIGURE 4 MAXIMUM ANGLE OF UPPER COLUMN TILT

4.7 Finish

4.7.1 Surfaces

Finished surfaces shall not have any hazardous projections and the edges shall be rounded or bevelled or otherwise treated to prevent injury to the operator.

4.7.2 Protective coating

A corrosion protection coating shall be applied to the vehicle support stand, except for mating or sliding parts.

NOTES:

- 1 The purpose of this Clause is to prevent excessive rusting.
- 2 Although any suitable protective coating may be used, the protective coating is to be applied using good commercial practice.
- 3 Some examples of suitable protective coatings are specified in AS 1192, AS 1789 and AS/NZS 3750.15.

5 STRUCTURAL INTEGRITY AND OVERLOAD CAPACITY

5.1 Structural integrity

When tested in accordance with Appendix C, a vehicle support stand shall support a force of 1.5 times its nominated capacity and shall not break, fracture or permanently deform by more than 1% of its original height and shall remain capable of easy and positive adjustment throughout its range of travel.

5.2 Overload capacity

When tested in accordance with Appendix D, a vehicle stand shall support a force of three times its nominated capacity and shall not break, fracture or permanently deform by more than 5% of its original height.

6 INSTRUCTIONS FOR ASSEMBLY

Where assembly is required, adequate instruction shall be provided to enable correct assembly of the stands.

7 INSTRUCTIONS FOR USE

Each stand shall be supplied with clear instructions explaining the safe use of the stand. The instructions shall include the following recommendations:

- (a) Use vehicle support stands on a hard level surface, preferably concrete.
- (b) Use vehicle support stands in pairs.
- (c) Check that no part of the underbody of the vehicle will foul as the stands are positioned.
- (d) Ensure that the locking mechanism is fully engaged.
- (e) Chock the unlifted wheels of the vehicle.
- (f) Do not extend the height of the stand beyond its maximum working height.

8 MARKING

Each vehicle support stand shall be permanently and legibly marked in English with the following or words to the same effect:

- (a) Name and address of the manufacturer, importer or other supplier of the vehicle stand.
- (b) The nominated capacity stated as 'Working Load Limit . . . kg'.
- (c) The maximum working height, in millimetres.
- (d) Clear and adequate operating instructions.
- (e) A warning notice stated as follows:

WARNING: USE ONLY IN PAIRS AND ON HARD LEVEL SURFACES (e.g. CONCRETE), ENSURING THE STAND IS POSITIONED UNDER A SOLID PORTION OF THE VEHICLE AND THAT THE LOCKING MECHANISM IS FULLY ENGAGED.

- (f) The manufacturing batch identification.

9 PACKAGING

If the vehicle support stands are packaged, then the following information shall be clearly marked on the packaging:

- (a) The 'height lowered' being the minimum height of the engagement head, in millimetres.
- (b) The 'height raised' being the maximum height of the engagement head, in millimetres.
- (c) The nominated capacity stated as 'Working Load Limit . . . kg'.

NOTE: Manufacturers making a statement of compliance with this Australian/New Zealand Standard on a product, packaging, or promotional material related to that product are advised to ensure that such compliance is capable of being verified.

APPENDIX A
METHOD FOR THE DETERMINATION OF STABILITY FACTOR
(Normative)

A1 SCOPE

This Appendix sets out a method for determining the stability factor for a vehicle support stand.

A2 PRINCIPLE

A number of measurements are taken in order to determine the stability factor which is a measure of the ability of a vehicle support stand to resist tipping as a result of its geometric design.

NOTE: Stability factor is defined in Clause 3.5.

A3 APPARATUS

The following apparatus is required:

- (a) A smooth flat surface.
- (b) A means of measuring linear distance to an accuracy of ± 0.5 mm.
- (c) A means of measuring the perpendicular height of a point above a plane.

A4 PROCEDURE

In order to determine the stability factor of a vehicle support stand it will normally be necessary to take several sets of measurements so that the least stable configuration of the stand can be determined.

For each set of measurements the procedure shall be as follows:

- (a) Position the stand in its intended work orientation on a smooth, flat surface.
- (b) Where the stand has provision for varying its height, adjust the stand until it is in the least stable configuration in which it could reasonably be expected to be used.

NOTE: The least stable condition is, normally, when the stand has been adjusted to its highest setting. For a pinned column vehicle support stand, this is the highest setting at which the pin will engage both the inner and outer columns. The practice of gaining extra height by using the stand with the pin engaging only one column and bearing against the end of the other column is considered misuse and should not be employed.
- (c) Select a point 'Q' on the upper face of the engagement head so that it is the furthest point from the axis of the stand (see Figure A1(a)).
- (d) If it is possible to rotate the engagement head relative to the base of the stand, do so until point 'Q' is at its closest position to the perimeter of the projected plan area of the base (see Figure A1(b)).
- (e) Measure the distance from the vertical projection of point 'Q' on the base plane to the perimeter of the projected plan area of the base. This is dimension *c* of the stability factor equation (see Figure A2).
- (f) Measure the perpendicular height of point 'Q' above the base plane. This distance is dimension *a* in the stability factor Equation A1.

- (g) Calculate the stability factor using the following equation:

$$\text{Stability factor} = \left(\frac{c}{a} \right) \times 60 \quad \dots \text{A1}$$

where 60 represents a constant so as to achieve a stability factor of not less than 7 and c and a are measured in millimetres.

A5 REPORT

The report shall include the following:

- (a) The minimum stability factor that was determined using the test procedure.
- (b) The distances, a and c , which were measured with the vehicle support stand in its least stable configuration.
- (c) A brief description of the least stable configuration found by the test.
- (d) Reference to this test method, i.e. AS/NZS 2538, Appendix A.

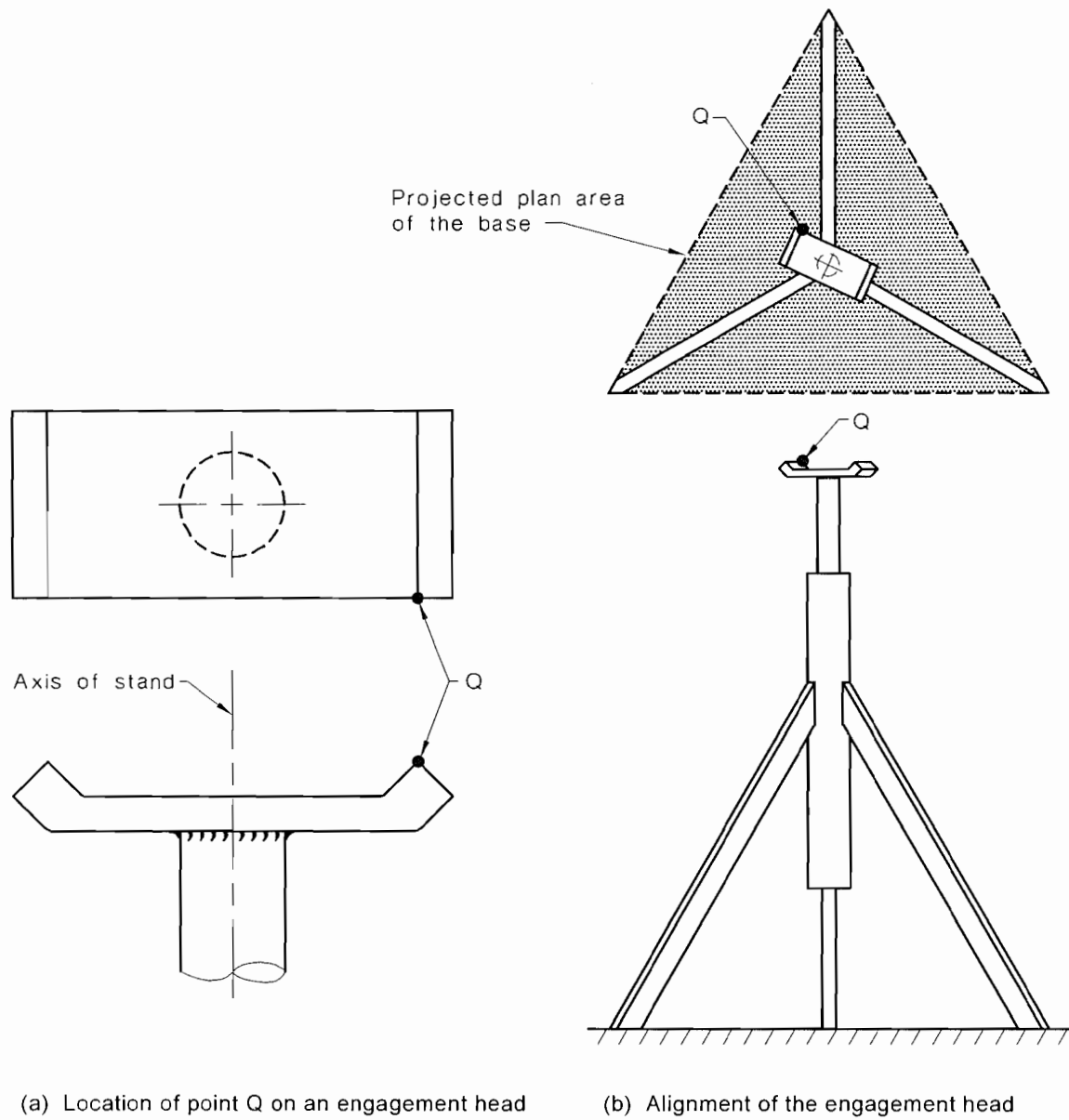


FIGURE A1 TYPICAL TRIPOD—BASE STAND

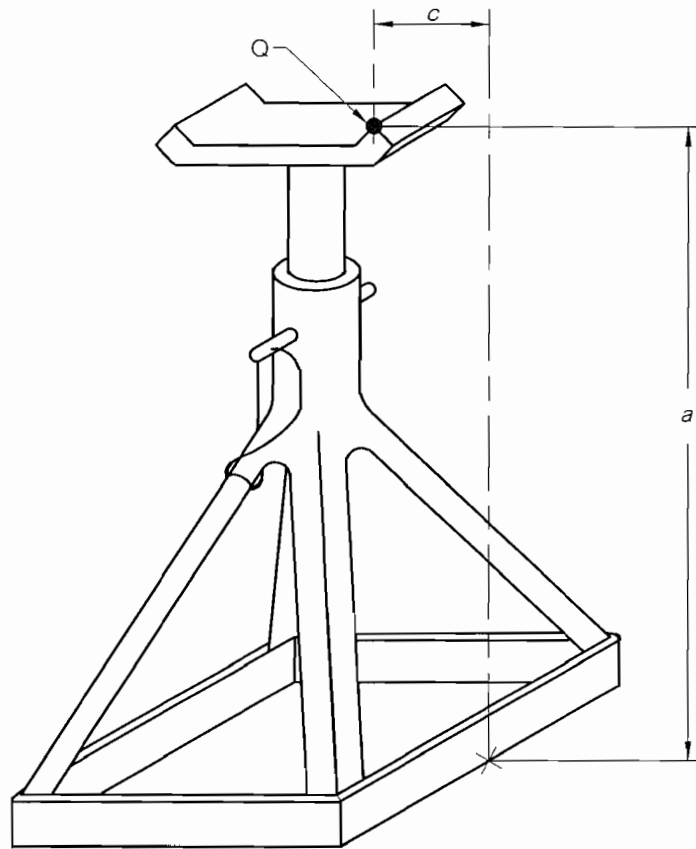


FIGURE A2 DIMENSIONS FOR THE DETERMINATION OF THE STABILITY FACTOR FOR A TYPICAL VEHICLE SUPPORT STAND

APPENDIX B

TEST FOR RELEASE UNDER LOAD

(Normative)

B1 SCOPE

This Appendix sets out the method for determining whether or not a vehicle support stand of variable height can be suddenly released when the stand is loaded.

B2 PRINCIPLE

A vehicle support stand of variable height is loaded with a specified mass and a specified force is applied to the height adjustment release mechanism in order to cause the mechanism to suddenly release.

B3 APPARATUS

The following apparatus is required:

- (a) A test mass of 100 kg or greater which is capable of being balanced on the engagement head of the stand to simulate the mass of part of a vehicle.

NOTES:

- 1 For the purpose of this test a hydraulic test rig is NOT suitable.
- 2 It is recommended that stands with a nominated capacity of 1000 kg be tested with a mass close to 100 kg. Stands rated at a greater capacity may require a greater test mass in order to function satisfactorily in this test.

- (b) A suitable device capable of applying to the height adjustment release mechanism of the stand a force of magnitude equal to—

$$F = 0.1g \times m$$

where

F = force, in newtons

g = 9.806 = acceleration due to gravity, in metres per second squared

m = test mass, in kilograms

B4 PROCEDURE

The procedure shall be as follows:

- (a) Position the vehicle support stand in its intended work orientation on a hard, flat surface.
- (b) Adjust the height of the stand to a position above the minimum height of the stand.
NOTE: It is not necessary to adjust the height of the stand to its maximum for this test. It is not intended that this be a test of the stability of the stand.
- (c) Lower the test mass gently onto the engagement head, ensuring that it is centrally located with respect to the projected plan area of the base.
- (d) Gradually apply a force, equal to 10% of the force applied by the action of gravity on the test mass, to the height adjustment release mechanism in a direction which would cause the mechanism to release.

NOTE: Assume that the acceleration due to gravity is 9.8 m/s² for the purpose of calculating the applied force.

- (e) Observe whether the height adjustment mechanism released.

B5 REPORT

The report shall include the following:

- (a) The test mass used.
- (b) Whether or not the height adjustment mechanism released when the specified force was applied.
- (c) Reference to this test method, i.e. AS/NZS 2538, Appendix B.

APPENDIX C
TEST FOR STRUCTURAL INTEGRITY
(Normative)

C1 SCOPE

This Appendix sets out a method for testing the structural strength of a vehicle support stand when loaded in its worst possible configuration.

C2 PRINCIPLE

A vehicle support stand is subjected to a specified eccentric force which is applied to the end of the engagement head that is extended, if possible, and orientated in such a position that would most likely lead to a break, fracture, or permanent deformation of the stand.

C3 APPARATUS

The following apparatus is required:

- (a) A suitable device (e.g. a hydraulic test rig) calibrated to ensure—
 - (i) a minimum readability of 1 in 40;
 - (ii) a minimum accuracy of $\pm 5\%$;
 - (iii) a minimum repeatability of $\pm 5\%$; andcapable of applying the appropriate force and having a means of indicating the force being applied. Alternatively, a suitable rig which employs a weight of appropriate mass to apply the force may be used.
- (b) A means of measuring linear distance to an accuracy of ± 0.5 mm.
- (c) A means of measuring perpendicular height of a point above a plane.
- (d) A 50 mm diameter metal rod through which the force can be transmitted to the engagement head.
- (e) A suitably large, hard, flat surface such as metal, onto which the vehicle support stand is stood and tested.

C4 PROCEDURE

The procedure shall be as follows:

- (a) Position the vehicle support stand so that it is in the least stable configuration (see Appendix A) and measure the height a shown in Figure A2.
- (b) Align the axis of the 50 mm diameter rod vertically so that it passes through the point Q on the periphery of the engagement head (see Figure A1).
- (c) Gradually apply a force via the rod to the engagement head and increase the force to 1.5 times the nominated capacity and then hold for 60 s.
- (d) Remove the force and measure the height a , in millimetres.
- (e) Manually adjust the height of the stand through its full range of travel.

C5 REPORT

The report shall include the following:

- (a) The loss of height, if any, which occurred, expressed as a percentage of the original height *a*.
- (b) In the event of a failure, the mode of failure.
- (c) Whether or not it was possible to manually adjust the height of the stand through its full range of travel.
- (d) Reference to this test method, i.e. AS/NZS 2538, Appendix C.

APPENDIX D OVERLOAD TEST

(Normative)

D1 SCOPE

This Appendix sets out a method for determining the vehicle stand's ability to support a force equal to three times its nominated capacity.

D2 APPARATUS

The following apparatus is required:

- (a) A suitable device (e.g. a hydraulic test rig) calibrated to ensure—
 - (i) a minimum readability of 1 in 40;
 - (ii) a minimum accuracy of $\pm 5\%$;
 - (iii) a minimum repeatability of $\pm 5\%$; andcapable of applying the appropriate force and having a means of indicating the force being applied. Alternatively, a suitable rig which employs a weight of appropriate mass to apply the force may be used.
- (b) A means of measuring linear distance to an accuracy of ± 0.5 mm.
- (c) A means of measuring perpendicular height of a point above a plane.
- (d) A 50 mm diameter metal rod through which the force can be transmitted to the engagement head.
- (e) A suitably large, hard, flat surface such as metal, onto which the vehicle support stand is stood and tested.

D3 PROCEDURE

The procedure shall be as follows:

- (a) Position the vehicle support stand so that it is in the least stable configuration (see Appendix A) and measure the height a shown in Figure A2.
- (b) Align the axis of the 50 mm rod horizontally so that it passes through the centre of the engagement head.
- (c) Gradually apply a force to the centre of the engagement head and increase the force to 3 times the nominated capacity and then hold for 60 s.
- (d) Remove the force and measure the height a , in millimetres.

D4 REPORT

The report shall include the following:

- (a) The loss of height, if any, which occurred, expressed as a percentage of the original height a (see Clause 5.2).
- (b) In the event of a failure, the mode of failure.
- (c) Reference to this test method, i.e. AS/NZS 2538, Appendix D.

NOTES

NOTES

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Australian/New Zealand Standards

Under a Memorandum of Understanding between Standards Australia and Standards New Zealand, Australian/New Zealand Standards are prepared by committees of experts from industry, governments, consumers and other sectors. The requirements or recommendations contained in published Standards are a consensus of the views of representative interests and also take account of comments received from other sources. They reflect the latest scientific and industry experience. Australian/New Zealand Standards are kept under continuous review after publication and are updated regularly to take account of changing technology.

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Standards Australia and Standards New Zealand are responsible for ensuring that the Australian and New Zealand viewpoints are considered in the formulation of international Standards and that the latest international experience is incorporated in national and Joint Standards. This role is vital in assisting local industry to compete in international markets. Both organizations are the national members of ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission).

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